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RAINFALL IN MADAGASCAR.

The insertion of the following table is due to a train of circumstances so circuitous as to be worthy of record as an illustration of the difficulty which arises from the absence of well-recognised centres of knowledge.

The representatives of the London Missionary Society issue yearly from the native press of Antananarivo a remarkably well-printed 8vo volume, of about 150 pages, *The Antananarivo Annual and Madagascar Magazine*, a record of information on the topography and natural productions of Madagascar, and the customs, traditions, language, and religious beliefs of its people. The eighth volume, that issued Christmas, 1884, came into the hands of Prof. Michael Foster, Sec. R.S., who wrote a very favourable notice of it, which appeared in a recent number of *Nature*. In this, Prof. Foster mentioned that the volume contained a table of rainfall. Dr. Hann read the review in *Nature*, and wrote to us to suggest that as it was impossible to get a copy of the *Antananarivo Annual* in Vienna, it would be well to reprint the table. We sent Dr. Hann's suggestion to the Secretary of the London Missionary Society, and he has favoured us with a copy of the annual, whence we reprint the article.

The story, however, is not yet ended. It will be seen that Mr. Richardson stated that the early part of 1881 was copied from the records published by the Jesuit Fathers. This started us on a fresh track, as it seemed likely that not only were there two records in Madagascar during recent years, but also that the record of the Jesuit Fathers might go back before 1881. We therefore wrote to the Rev. S. J. Perry, S.J., F.R.S., asking his help. He has no copy himself, and on writing to the French agent of the Jesuit Fathers he says that he fears that the war has destroyed all chance of obtaining information, but that he has written to Taramave to see what can be done :—

RAINFALL OF ANTANANARIVO FOR FOUR YEARS.

In order to present our readers with a full record of nearly four years, I have taken the amounts from January to September of 1881

from the record published by the Jesuit Fathers, my own observations having commenced in October of that year. I leave the readers to make their own comparisons. It will be noticed that the fall for the present year has been the heaviest of the four.*

Month.	1881.	1882.	1883.	1884.	Average 4 Years.	True Average.
	in.	in.	in.	in.	in.	in.
January ...	12·98	(23) 12·50	(30) 16·86	(25) 11·91	13·56	13·56
February ..	4·57	(11) 6·95	(16) 7·12	(22) 12·48	7·78	7·78
March	9·50	(16) 4·01	(19) 9·04	(23) 11·54	8·53	8·52
April	1·74	(6) 0·63	(4) 0·88	(7) 2·39	1·41	1·41
May	0·20	(4) 0·58	(4) 1·59	(3) 1·23	0·90	·90
June	0·60	(0) 0·0	(1) 0·33	(?) 0·06	0·11	·25
July.....	0·70	(0) 0·0	(5) 0·21	(1) 0·02	0·075	·23
August ...	0·10	(0) 0·0	(1) 1·07	(1) 0·12	0·32	·32
September.	0·20	(0) 0·0	(0) 0·0	(7) 1·42	0·405	·41
October ..	(3) 1·97	(4) 1·72	(9) 6·38	(15) 6·66	4·70	4·18
November.	(6) 2·45	(11) 7·60	(12) 6·07	(13) 6·82	5·735	5·74
December .	(13) 7·11	(15) 7·09	(15) 9·12	(24) 14·21	9·38	9·38
Total	42·12	(90) 41·08	(116) 58·67	(143) 68·86	52·31	52·68

The rainy season began on October 2nd, 1882, and 1883, and a heavy storm passed over the capital on October 1 (Leap-Year), 1884, when we had ·98 in. in less than 20 minutes; and on October 27th we had 2·25 in. in much less than half an hour.

The figures in brackets give the number of days on which rain fell.

J. Richardson.

Faravohitra, Jan. 1st, 1885.

NOTES ON THE WEATHER OF A CENTURY AGO.

By Charles Tomlinson, F.R.S.

Having had occasion recently to refer to the letters of the poet Cowper, I was struck with his frequent remarks on the weather. It may be some consolation to those persons who imagine that our climate has deteriorated, to find that the poet complained of cold and wet summers, unseasonable springs and winters, pretty much as we do. I am writing these remarks on the 8th of May, by the side of a blazing fire, hail having just whitened the streets, and snow was reported yesterday from Kent. This cold weather is attributed to a multitude of icebergs which have been launched from their Arctic home into the Atlantic, and have converted the "ethereal mildness"

* The author or the printer has gone astray in the last column, which in two or three months will not at all agree with the previous ones. We have, therefore, re-worked the averages, assuming the monthly amounts (which agree with the yearly totals) to be correct. The differences are not essential, but we cannot pass them without notice.

of our April into a wintry May. Cowper makes the same complaint about icebergs, and suggests that they should be furnished with sails, for the purpose of wafting them down to Equatorial regions; but he was not aware that about seven-eighths of the mass of an iceberg is below the surface of the water, so that our puny efforts would be exerted in vain to remove these tremendous masses.

Our poet records a violent storm on the 9th of May, 1780, during which he watched a crow struggling hard to retain its seat in its nest on the top of a tall tree.

1781. In May of this year, he says that his poems were written during the winter, "Hence it comes to pass that the season of the year which generally pinches off the flowers of poetry unfolds mine, such as they are, and crowns me with a winter garland. In this respect, therefore, I and my contemporary bards are by no means on a par. They write when the delightful influence of fine weather, fine prospects, and the brisk motion of the animal spirits make poetry almost the language of nature; and I, when icicles depend from all the leaves of the Parnassian laurel, and when a reasonable man would as little expect to succeed in verse as to hear a blackbird whistle." On June 5th, 1781, he writes:—"These seasonable showers have poured floods upon all the neighbouring parishes, but have passed us by. My garden languishes, and what is worse, the fields too languish, and the upland grass is burnt."

1782. On the 2nd of February, he says:—"No winter since we knew Olney has kept us more confined than the present. We have not more than three times escaped into the fields since last autumn." In August of the same year he is troubled with floods.

1783. On February 13th, he refreshed himself with a walk in the garden, "where I find that January (who according to Chaucer was the husband of May) being dead, February has married the widow." On June 13th, 1783, he writes:—"We have had more thunderstorms than have consisted well with the peace of the fearful maidens in Olney * * Yesterday morning, at seven o'clock, two fire-balls burst either in the steeple or close to it. William Andrews saw them meet at that point, and immediately after saw such a smoke issue from the apertures in the steeple as soon rendered it invisible. The noise of the explosion surpassed all the noises I ever heard; you would have thought that a thousand sledge-hammers were battering great stones to powder, all in the same instant. The weather is still as hot, and the air as full of vapour as if there had been neither rain nor thunder all the summer." On the 19th he writes:—"The summer is passing away, and hitherto has hardly been seen or felt. Perpetual clouds intercept the influence of the sun, and for the most part there is an autumnal coldness in the weather, though we are almost upon the eve of the longest day." On September 29th he refers to "the ill effects of this unhealthy season."

1784. February 22nd. He expresses congratulations on the thaw, and complains of the frost having frozen the ink in his ink-

stand. The frost had lasted nine weeks. On July 5th he says that during the whole month of June "we have experienced almost the rigours of winter."

1788. March 19th. "The spring is come, but not I suppose that spring that our poets have celebrated. So I judge at least, by the extreme severity of the season, sunless skies and freezing blasts surpassing all we experienced in the depth of winter." May 6th. "What constitution or what skin can possibly be proof against our vernal breezes in England?" June 17th. "The east and north-east winds breathe winter upon the roses of June." In September he complains that our summers are hardly ever warm or cold enough. "Were they warmer we should not want a fire, and were they colder we should have one."

1792. June 19th. He speaks of the "ice-islands (that is, ice-bergs) that spoil all our summers," to which we have alluded in the beginning of this article.

A FLOATING MID-ATLANTIC METEOROLOGICAL OBSERVATORY.

The following extract from the Signal Office *Monthly Weather Review* for January, 1885, is of interest, as almost completely confirming the remarks on page 34 of our last number :—

SIGNAL SERVICE AGENCIES.

Signal Service agencies have been established in the Maritime Exchange buildings in New York and Philadelphia, and in the Custom House at Boston, where the necessary blanks and other information will be furnished to shipmasters.

The following circular explains the object of these agencies :—

UNITED STATES OF AMERICA,
SIGNAL OFFICE, WAR DEPARTMENT,
Washington City, November 29th, 1884.

SHIPMASTERS.—It is now generally known that a large percentage of *American storms* travel across the Atlantic, and in a few days after leaving our coast affect the *weather conditions of Europe.* Shipmasters' observations prove this, and Captain Henry Toynbee, Marine Superintendent of Great Britain, who has investigated the subject with much vigor, says : "E.N.E., thirty to forty miles an hour, has been adopted as a rough estimate of the track and speed of storms crossing the Atlantic, until they arrive off the west coasts, when they are affected by the disposition of pressure over western Europe."

How important it is, then, for the shipmaster about to sail to America from European ports to know the *probable weather conditions* he is likely to have on his westward passage, or where he will be likely to encounter a *storm or hurricane at sea.*

The London Meteorological Office will now make an earnest effort to make such predictions, and, in connection therewith, *the United States Signal Service,* at the solicitation of *the Meteorological Council of Great Britain.* has accepted an invitation to lend assistance in this important movement to benefit the *commerce of the whole world,* and will collect meteorological information from ship-

masters arriving in New York and Boston, and cable the same to the London Meteorological Office. From this point bulletins and warnings will be issued and telegraphed in times of great danger to all *European seaports*.

* * * * * *

I am, very respectfully, your obedient servant,

W. B. HAZEN,
Brig. & Bvt. Major-General
Chief Signal Office U.S.A.

In pursuance of the arrangements made with the Meteorological Office of London, England, there have been cabled to that office from New York twelve reports of storms encountered by vessels on the Atlantic, west of the forty-fifth meridian. Three messages were sent from Boston.

We have also been favoured with the following letter from Mr. Harding, with reference to the remarks at the bottom of page 34 of this vol. of the Magazine. Mr. Harding also sent a reprint of the specification of his patent (1882, August 10, No. 3827), from which we extract a paragraph which shows how thoroughly he thought out the subject more than two years ago. It contains also appreciatory notices by Prof. Buys Ballot and others :—

To the Editor of the Meteorological Magazine.

SIR,—I thank you for a copy of your paper.

I have a patent for a vessel which could be used as a Floating Telegraph Ship for the Mid-Atlantic, to be moored in the usual track of the cyclones approaching these islands.

I used a vessel of the shape shown by the enclosed plan [almost exactly that of a magnifying glass,—ED.] for years for watching a large Fishery I hire in the Wash, covering a length of foreshore of upwards of 11 miles.

The vessel was used by water bailiffs to live on board and watch the beds, where no vessel riding to her anchor and swinging with each tide could possibly live. From the form of the bottom of this vessel the waves were deflected *under* her, and she rode like a basin on the water, and is capable of being moored with four anchors and cables, one to each point of the compass; by this means she can be moored in one fixed spot.

The vessel is now very old and rusted through, and lies on the shingle beach at Snettisham, Norfolk She would ride out the heaviest gales with ease.

A vessel her shape, 500 to 1000 feet in diameter, would be capable of riding in the Mid-Atlantic in any weather, and being connected with the shore by an electric cable.

It is a matter which might pay an enormous profit, as in addition to being used by the Government for Meteorological purposes, it could be used as an ocean telegraph station, and also as a port of call.

It is a matter the Government ought to take up, or a public company.

No other vessel could be moored in *one* fixed spot without swinging, which would very shortly break the insulation of the electric cable.

I place buoys every 50 or 100 fathoms along the four riding cables, so that there is no more pressure on the vessel from the enormous length of steel wire cable to say to 2000 fathoms depth than a vessel riding in a bay in 40 or 50 fathoms, as the cable is self-buoyant.

Yours truly,

C. W. HARDING.

The Chase, King's Lynn, April 25th, 1885.

The following paragraph occurs in the specification :—

"I claim as my invention * * * * Fifteenthly, the use of my vessel as a Telegraph Station, or ship, capable of being moored in deep water, and it could also be moored in the Mid-Atlantic, from which telegraphic messages could be transmitted to shore, giving forecasts of the weather and other matters of meteorological importance, connected with cyclonic and storm disturbances, for which purpose it could be placed in any part of the sea or ocean.

"When the vessel is placed, say in a thousand fathoms of water, I propose to use steel wire ropes as cables or hawsers for mooring, with rings spliced into the cable at convenient distances, and to each of these rings I attach a buoy or air tight vessel, having buoyancy to sustain a relative portion of the dead weight of the cable as shown in Fig. 5, and round one or more of such cables I wind an insulated wire for the transmission of telegraphic messages to the shore."

ATLANTIC TIDES AS STORM WARNINGS.

To the Editor of the Meteorological Magazine.

SIR,—It is a well-known presage of storm, and oftentimes of general weather, especially on our Atlantic coasts, to note the action of the tides above or below the normal, on the approach of cyclones, or on the prevalence of certain constant winds.

In the extreme islands off the west coast of Scotland, this action has been for generations the never-failing barometer of the inhabitants, who are at once excellent and daring seamen, and well known, from their constant experience of storms, to be accurate forecasters of bad weather. With them the study is oftentimes one of life and death, and they rely in a marked manner on their observance of the tidal levels from day to day throughout winter. Amongst them it is a well-established fact that the waters of the Atlantic rise abnormally high for 48 hours and downwards, before the arrival of a cyclone, the height and time period varying with the force of the approaching disturbance. Indeed, so well is this axiom established, that according to the speed of the rise, or the attainment of high water before the normal time, or the retardation of low water under the same circumstances, they can determine whether the approaching disturbance is of a first or second class order, and frequently its direction, whether central or skirting their meridian. The most marked action is of course after a period of calm weather, but even in the midst of passing storms the maintenance of the tidal level at an abnormal height is a certain indication of continued gales, or shortly recurrent disturbances, and similarly the decadence of the tide levels is a sign of northerly or easterly winds of a constant nature, which in these districts is a sure indication of fair weather.

Here, therefore, nature supplies us with an instrument of her own which, if properly studied in a few well chosen positions on the west coasts of Ireland and Scotland, will provide us with information which will go far to correspond with the results of an observer's station 1000 miles westward of our coasts.

If the daily records of the tides at these stations were faithfully recorded, and compared with the normal levels, and with periods of flow and ebb, as the rainfall is now so admirably collected by yourself, I venture to believe that very valuable data for forecasting would soon be established with greater certainty than by the barometrical gradient system now prevailing, and we should have the assistance of unerring data in determining results.

Of course where there are self-recording tidal gauges the work is more than half done already, and known data can be at once established for every month in the year.

Yours faithfully,

G. W. BRENAN, C.E.

Oban.

THE STAMFORD MERCURY.

To the Editor of the Meteorological Magazine.

SIR,—I shall be very grateful to any reader of *The Meteorological Magazine*, who can put us in the way of obtaining a record of meteorological observations taken in 1763, by the Rev. Caleb Parnham, rector of Ulford, near Stamford, in that year. The observations were recorded, I believe, in *The Lincoln, Rutland and Stamford Mercury* (commonly called *The Stamford Mercury*), in 1763, a file of which has not been kept in the office of that paper."—

Yours truly,

FRED. COVENTRY.

Ketton, Stamford, May 8, 1885.

[This is not the first time that inconvenience has arisen from the absence of a file of its own issues at the *Stamford Mercury* office. The journal is one of the oldest, if not the oldest in the British Isles having been published every week for 190 years! Possibly the proprietors *have* tried to escape from the unenviable if not unique position in which their predecessors have left them, but our impression is that their efforts towards obtaining a series of the early years have not been very heroic. There are, we believe, many years in the British Museum Library, but we do not know whether 1763 is among them. Some years back the sets of newspapers in the British Museum were very incomplete—it seemed as if they were regarded as useless lumber rather than as splendid materials for future history.—ED.]

ON RELATIVE HUMIDITY AND THE DRYNESS OF THE AIR.

To the Editor of the Meteorological Magazine.

SIR,—Last Monday, April 20th, the air appeared to be unusually dry for this time of the year, and in order to test this the following observations were made. The temperature of the wet bulb has been given, but no use of it has been made in determining the relative humidity. During the time that the observations were taken (0.15 to 0.30 p.m.) there was no cloud, and the dry and wet bulb thermometers remained remarkably steady. The averages were 69°·2 for the dry bulb, 54°·9 for the wet. The dew point, taken at the same time by my hygrometer (with iced water and salt), was, on the contrary, most erratic, and its temperature varied with every puff of wind from 28° to 36°; this makes the relative humidity at the time to vary from 21 to 30 per cent. The air does not often attain to this degree of dryness; on the other hand it is not unprecedented. I find on referring to my journals that on July 1st, 1881, at 3.30 p.m., the dry bulb was 75°, the wet bulb 54°·2, while the dew point was only 21°; this shows the relative humidity to have been as low as 13 per cent. On this occasion the dew point was taken by means of ether, and I cannot place so much confidence in the result as if water had been used. Again, on March 29th, 1880, about 3 p.m., the means of 12 observations gave as follows:—dry bulb, 58°·7; wet bulb, 44°·7; the dew point, 13°·5; this makes the relative humidity 16 per cent. A difference of 25° between the temperature of the dry and wet bulbs has occasionally occurred in this country; this shows the air to have been very dry, but does not help us as far as relative humidity is concerned. The nearest approach to this difference of which I have any record, occurred on August 13th, 1876, at 3.40 p.m., when the dry bulb was 92°·6, the wet bulb 68°·4, the dew point taken at the same time by means of well water was 59°·5; this gives 34 as the relative humidity.

We have for many years past relied almost exclusively upon the indications of the dry and wet bulb thermometers to give us the relative humidity of the air, it is now admitted * that "all deductions from these are open to doubt." I should go further than this, and say that they ought not any longer to be used for that purpose. It is only too true to say, that out of the mass of observations which has been accumulating for the last few years, we have no data upon which we can rely, to ascertain to what degree of humidity the air attains in this country, and what is of far more importance, to compare the dryness of the air at one place with that at another; even at times when both thermometers read alike it does not follow that the air is saturated with vapour, or in other words, that its relative humidity is 100. Objections have been made to the form in which the

* See *Hints to Meteorological Observers*, page 11, prepared under the direction of the Council of the Royal Meteorological Society.

figures composing a table of relative humidity are given, but this is as nothing when compared with the manner in which those figures are obtained.

I should be sorry to say one word against the use of the dry and wet bulb thermometers, but the four instances given above, and which might be supplemented by thousands, show plainly that they are not fitted to give the dew point temperature, and it is to the persistent use of them for this purpose, that Mason's Hygrometer, one of the most simple and useful of all meteorological instruments has been brought into discredit.

GEORGE DINES.

Walton-on-Thames, April 24th, 1885.

RAINFALL AND PERCOLATION AT BEDFORD FOR THE PAST 18 MONTHS.

		Rain in inches.	Percolation. inches.	Loss inches.
1883.	November	2·17	1·10	1·07
,,	December	·87	·80	·07
1884.	January	1·70	·90	·80
,,	February	·65	·50	·15
,,	March	·91	·58	·33
,,	April	1·26	·15	1·11
,,	May	·70	·05	·65
,,	June	1·81	·15	1·66
,,	July	3·17	·70	2·47
,,	August	1·25	·13	1·12
,,	September	1·50	·65	·85
,,	October	1·17	·42	·75
,,	November	1·15	·55	·60
,,	December	1·77	1·15	·62
1885.	January	1·27	·80	·47
,,	February	1·77	1·40	·37
,,	March	1·17	·85	·32
,,	April	2·23	·94	1·29
	Total in 1½ yrs.	26·52	11·82	14·70

The light rainfall during the past eighteen months is very notable, and shows a marked contrast when compared with the wet and cold cycle of preceding years. The average rainfall of the nine years preceding 1884 was 26·25 in., and the past eighteen months being 26·52 in., is only a fraction more. If it be true, as is generally accepted, that the extra rains carried down a good deal of fertilising matter from the soil, the land must now have recovered its normal condition. Doubtless the low temperature of these summers, which accompanies leaky skies, had impaired the farm crops, and to both causes the husbandman may, in a great measure, ascribe his serious pecuniary difficulties. The percolation as measured by a Dalton gauge, having two and a half feet of earth of a medium water-holding power, amounts to 11·82 inches, and the remainder 14·70 in. has passed upwards by evaporation.

DAVID ROBIE.

ROYAL METEOROLOGICAL SOCIETY.

THE usual monthly Meeting of this Society was held on Wednesday, April 15th, at the Institution of Civil Engineers, 25, Great George Street, Westminster, Mr. R. H. Scott, F.R.S., president, in the chair, when the following papers were read :—

(1) "Report of Committee on Decrease of Water Supply." This Committee was appointed to take into consideration the question of the decrease of water in springs, streams, and rivers, and also the simultaneous rise of the flood-level in cultivated countries. As far as any inference can be drawn from the records collected by the Committee it appears that the years 1820, 1821, 1824, 1835, 1838, 1845, 1847, 1850, 1854, 1855, 1858, 1859, 1864, 1865, 1871, 1874, 1875 and 1884 have been periods of marked low water. On the other hand, the years 1817, 1825, 1830, 1836, 1841, 1842, 1853, 1860, 1861, 1866, 1873, 1877, 1879, 1881 and 1883 have been periods when there has been exceptionally high water. In 1852 the water was very low in the early part of the year, while at the end of the year it was very high. In the intervening periods the water has been of moderate altitude. It does not appear from existing records that there is any diminution in the water supply of this country, and the large quantity of water which has been stored or has flowed off the ground between 1876 and 1884 is confirmatory of this view. There appear, however, to be periods when there is exceptionally low water, and these are almost immediately followed by periods of exceptionally high water. With reference to the increase of floods, it does not appear from the records that there is any great increase in the height to which the floods rise in this country. Whether or not the height to which floods have risen in recent years has been affected by river improvements and the greater facility with which floods can be got rid of, or whether there is a diminution in the quantity of water, are questions upon which the Committee have not at present sufficient information to speak positively.

(2.) "Report of Committee on the Occurrences of the Helm Wind of Cross Fell, Cumberland, from 1871 to 1884." In response to a letter inserted in the Penrith newspapers, the Committee has received a number of communications bearing on the subject of the Helm Wind. With the view of ascertaining as far as possible the meteorological conditions which exist when the Helm Wind is blowing, all the recorded occurrences that have been received have been chronologically arranged. The first systematic record commences in 1871, and in this Report the Committee deals with all occurrences from that date to the end of 1884. Since that time, at the instigation of the Royal Meteorological Society, more detailed records have been commenced at numerous stations in the locality. Ninety-three instances of the Helm Wind were recorded between 1871 and 1884; the months with the greatest frequency being February, March, April and November. On examining the Daily Weather Reports it was clearly seen that whenever the Helm Wind was blowing there was

an Easterly wind, not only in the locality, but generally over the entire country. As the Helm Wind seemed to occur so regularly with the Easterly wind; the Committee further extended the inquiry with regard to the East wind. The Daily Weather Charts were consequently examined for each day from January 1st, 1871, to December 31st, 1884, and every occurrence of East wind was tabulated; the instances with general easterly conditions over the whole country being kept separate from those instances in which the Easterly wind was only partial, though of sufficient intensity to occasion the Helm wind. This examination showed that although the wind over the United Kingdom is generally Easterly when the Helm occurs, yet the Helm by no means occurs whenever the wind is Easterly. Indeed, this step in the inquiry has not at all tended to the elucidation of the phenomenon in question, for it frequently happens that the conditions are, to all appearances, precisely similar when the Helm is on, and yet no such occurrence has been recorded. This may in part be due to the occasional omission to record the Helm, although it cannot possibly be in the main attributable to such an omission; but it points to other conditions being necessary besides absolute agreement of wind direction and isobaric lines. Possibly the different hygrometric qualities of the air with the existing Easterly winds may be an important factor in deciding whether or no the Helm will be formed, but it is not readily conceived why even in this case the Helm wind should not blow. It must, however, be borne in mind that the surface winds only can be examined, whilst those at a comparatively small elevation may be intimately connected with the phenomenon. From the observations made prior to those started at the beginning of 1885, no idea can be formed of the behaviour of the upper currents even at the time of the occurrence of the Helm winds, far less with the occurrence of each East wind experienced. The Society has, however, provided for the extension of the inquiry in this direction in the records which are now being collected, the observers supplying observations of the upper currents by means of the clouds, as well as the direction of the winds at the surface of the earth. As soon as a sufficient number of these observations has been received the Committee hopes to present a further Report which will tend to explain the phenomenon of the Helm wind.

(3.) "Results of Meteorological Observations made at Asuncion, Paraguay," by R. Strachan, F.R.Met.Soc.

COLLIERY EXPLOSIONS.—In a paper contributed to *La Houille* on explosions of firedamp and barometric falls, M. de J. Lebrun throws a doubt on their connection. He says that several English engineers and men of science have sought to establish a coincidence between great barometrical depressions and explosions of firedamp; but an inspection of the tables published by the French Commission on Firedamp does not appear to prove this. There are as many explosions at moments when the barometer does not vary, and when it rises, as there are when it falls.—*English Mechanic.*

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, OCT., 1884.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0–100	°	°	inches		
England, London	63·9	16	32·2	29	57·1	41·9	43·3	79	104·7	25·6	·99	10	6·0
Malta	82·2	7	56·8	30	74·9	63·4	59·8	77	131·9	51·3	1·32	5	3·8
Mauritius	82·0	9	60·1	1	78·9	66·7	62·5	74	134·3	53·0	2·85	10	5·3
Calcutta	88·2	13	65·9	30	84·9	73·3	72·4	82	153·0	52·0	3·71	5	4·2
Bombay	90·4	19	70·8	17	86·7	74·6	72·3	76	149·9	60·4	2·22	8	3·1
Ceylon, Colombo	85·2	7	72·4	20	83·6	75·1	72·2	78	145·0	64·0	13·51	27	7·4
Melbourne	86·0	25	36·0	7	65·1	46·5	45·1	72	145·0	29·1	3·04	16	6·2
Adelaide	91·8	19	41·7	13	69·6	50·2	45·5	58	146·0	32·9	1·32	10	5·2
Wellington	66·5	24	36·5	16	59·6	46·4	...	...	140·0	34·0	7·33	12	...
Auckland	68·0	27	43·0	15	63·1	50·5	47·2	70	143·0	36·0	2·86	21	6·0
Jamaica, Kingston	88·6	11*	68·5	19	86·7	72·5	72·3	82	...	...	9·00	...	7·2
Barbados	84·0	var.	70·0	22	82·0	72·0	75·9	84	146·0	...	9·54	19	5·0
Toronto	81·5	4	24·3	24	56·8	39·7	44·0	77	135·4	18·0	1·50	14	5·8
New Brunswick, Fredericton	71·8	1	20·2	16	52·8	32·4	34·8	74	...	...	2·68	13	5·6
Manitoba, Winnipeg	74·1	15	4·3	31	49·2	29·2	33·4	76	...	...	1·51	10	6·2
British Columbia, Victoria	62·0	13	30·0	2	...	...	...	...	...	..	4·88	14	...

* And 12.

REMARKS, OCTOBER, 1884.

MALTA.—Mean temp., 68°·0; mean hourly velocity of wind, 7·8 miles; sea temp. fell from 77° to 72°; T and L on four days, L on six. J. SCOLES.

Mauritius.—Rainfall, 1·31 in., and temp. 0°·1 above average; mean hourly velocity of wind, 1·3 miles below average; extremes 30·4 miles on 12th, and 1·7 miles on 19th; T and L on two days, L on one. Sky glows occasionally.

C. MELDRUM, F.R.S.

COLOMBO.—T on 16 days, L on 6. F. C. H. CLARKE, Major R.A.

Melbourne.—Mean temp. 2°·4, and temp. of dew point 1°·2 below average; rainfall, amount of cloud, humidity, and pressure all very near their respective averages. Prevailing winds S. and S.W., strong on six days; severe TS on 20th.

R. L. J. ELLERY, F.R.S.

Adelaide.—One of the coldest Octobers recorded here, mean temp. 59°·9, 2°·1 below average; rainfall and pressure slightly below average; amount of cloud slightly in excess. On the evening of the 19th a very heavy dust storm was preceded and followed by an unusually brilliant display of L; scarcely any T was heard, and very little R fell. C. TODD.

Wellington.—Up to the 6th fine and pleasant; severe TS and heavy R on 7th, 1·50in. falling before 9·30 a.m., causing floods and damage; tolerably fine till 13th, then stormy till 15th, with T, H and R; showery and squally to 20th; from the 21st to the 28th generally fine, then showery to the end. R. B. GORE.

Auckland.—On the whole a cold, showery and windy month; mean temp., rainfall, and pressure all slightly below the average. T. F. CHEESEMAN.

KINGSTON.—Very heavy R 7th and 8th in the eastern part of the island, with loss of life and much damage from floods; the night of 7th and morning of 8th were stormy also in Kingston, 7 or 8 inches of R falling, with gusts from S.E.

MAXWELL HALL.

BARBADOS.—Mean temp. (76°·4) 0°·6 below average; rainfall about the average; pressure fluctuating; mean hourly velocity of wind 5·1 miles, extremes 7·9 miles and 2·5 miles; 35 per cent below the average. R. BOWIE WALCOTT.

SUPPLEMENTARY TABLE OF RAINFALL, APRIL, 1885.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	1·37	XI.	Rhayader, Nantgwillt..	3·54
,,	Margate, Birchington...	·83	,,	Carno, Tybrith	1·72
,,	Littlehampton	·81	,,	Corwen, Rhug	2·43
,,	Hailsham	..	,,	Port Madoc	2·20
,,	I. of W., St. Lawrence.	·91	,,	I. of Man, Douglas	3·45
,,	Alton, Ashdell.....	1·63	XII.	Stoneykirk, Ardwell Ho.	2·73
III.	Winslow, Addington ...	1·97	,,	Melrose, Abbey Gate ...	2·82
,,	Oxford, Magdalen Col...	1·72	XIII.	N. Esk Res. [Penicuick]	2·00
,,	Northampton	2·05	XIV.	Ayr, Cassillis House ...	1·65
,,	Cambridge, Beech Ho...	1·98	,,	Glasgow, Queen's Park.	1·40
,,	Wisbech, Bank House..	·97	XV.	Islay, Gruinart School..	2·15
IV.	Southend	·71	XVI.	St. Andrews, Newton Bk	2·80
,,	Harlow, Sheering	1·77	,,	Balquhidder, Stronvar..	4·92
,,	Rendlesham Hall	1·59	,,	Dunkeld, Inver Braan..	3·29
,,	Diss	1·44	,,	Dalnaspidal H.R.S. ...	2·64
,,	Swaffham	1·50	XVII.	Keith H.R.S.	1·01
V.	Salisbury, Alderbury...	1·81	,,	Forres H.R.S.	·65
,,	Warminster	2·63	XVIII.	Strome Ferry H.R.S....	1·89
,,	Calne, Compton Bassett	1·92	,,	Lochbroom	·83
,,	Ashburton, Holne Vic..	6·94	,,	Tain, Springfield.....	·68
,,	Holsworthy, Clawton...	3·15	,,	Loch Shiel, Glenaladale	5·35
,,	Hatherleigh, Winsford.	3·44	,,	Invergarry	2·77
,,	Lynmouth, Glenthorne.	2·87	XIX.	Lairg H.R.S.	·61
,,	Probus, Lamellyn	3·86	,,	Forsinard H.R.S.	·98
,,	Wincanton, Stowell Rec.	3·21	,,	Watten H.R.S.	·95
,,	Wells, Westbury.....	3·15	XX.	Dunmanway, Coolkelure	5·70
VI.	Bristol, Clifton	2·18	,,	Fermoy, Gas Works ...	3·62
,,	Ross	...	,,	Tralee, Castlemorris ...	2·98
,,	Wem, Sansaw Hall.....	2·15	,,	Tipperary, Henry Street	3·75
,,	Cheadle, The Heath Ho.	1·85	,,	Newcastle West	1·54
,,	Worcester, Diglis Lock	2·13	,,	Miltown Malbay.....	2·46
,,	Coventry, Coundon	2·46	,,	Corofin	...
VII.	Melton, Coston	1·70	XXI.	Carlow, Browne's Hill..	3·81
,,	Ketton Hall [Stamford]	1·85	,,	Navan, Balrath	3·35
,,	Horncastle, Bucknall ...	1·30	,,	Mullingar, Belvedere ...	2·26
,,	Mansfield, St. John's St.	1·88	,,	Athlone, Twyford	3·47
VIII.	Macclesfield, The Park.	1·63	XXII.	Galway, Queen's Col....	2·60
,,	Walton-on-the-Hill.....	1·61	,,	Clifden, Kylemore	5·38
,,	Lancaster, South Road.	1·61	,,	Crossmolina, Enniscoe..	3·12
,,	Broughton-in-Furness ..	...	,,	Carrick-on-Shannon ...	2·02
IX.	Wakefield, Stanley Vic.	1·53	XXIII.	Dowra	...
,,	Ripon, Mickley	1·82	,,	Rockcorry.....	3·55
,,	Scarborough.....	2·15	,,	Warrenpoint	4·35
,,	East Layton [Darlington]	1·96	,,	Newtownards	2·53
,,	Middleton, Mickleton ..	1·39	,,	Belfast, New Barnsley..	2·16
X.	Haltwhistle, Unthank..	1·74	,,	Cushendun	2·71
,,	Shap, Copy Hill	3·70	,,	Bushmills	2·26
XI.	Llanfrechfa Grange	2·42	,,	Stewartstown	2·02
,,	Llandovery	2·65	,,	Buncrana	1·85
,,	Castle Malgwyn	4·07			

APRIL, 1885.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1870–9	Greatest Fall in 24 hours. Dpth	Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date	Min. Deg.	Date	No. of Nights below 32°. In shade.	On grass.
			inches	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	2·32	+ ·30	·79	15	11	72·8	20	29·3	4	3	13
II.		Maidstone (Hunton Court)...	2·17	+ ·32	·85	15	12	...	...	...	...	...	...
,,		Strathfield Turgiss	1·28	— ·63	·34	5	12	72·9	19	23·9	4	5	9
III.		Hitchin	2·68	+ ·73	·69	15	15	70·0	20	23·0	3	8	...
,,		Banbury	2·21	+ ·20	·56	15	15	69·0	21	25·0	5	4	...
IV.		Bury St. Edmunds (Culford)	1·67	— ·12	·39	9	15	73·0	22	22·0	2, 3	9	...
,,		Norwich (Cossey)	1·30	— ·56	·36	8	13	74·0	22	24·0	5	7	7
V.		Weymouth(LangtonHerring)	2·34	...	·56	28	14	...	...	...	...	...	...
,,		Barnstaple.....	2·44	+ ·06	·50	28	12	72·0	22	33·0	5	...	...
,,		Bodmin	5·82	+ 2·49	1·06	24	16	65·0	20	31·0	4	1	15
VI.		Stroud (Upfield)	2·15	— ·30	·75	1	16	70·0	21	30·0	2*c*	4	...
,,		ChurchStretton(Woolstaston)	3·26	+ ·94	·75	25	14	68·0	19	27·5	5	7	10
,,		Tenbury (Orleton)	2·48	+ ·31	·61	15	14	72·2	21	24·3	8	16	18
VII.		Leicester	2·24	...	·48	1	15	71·5	19*a*	25·5	5	3	17
,,		Boston	1·27	— ·62	·49	1	10	75·0	19	28·0	4	3	...
,,		Grimsby (Killingholme).....	1·82	+ ·06	·58	1	15	69·0	21	29·5	4	3	...
,,		Hesley Hall [Tickhill].....	1·57	...	·31	1, 6	14	71·0	19	23·0	4, 5	9	...
VIII.		Manchester (Ardwick).....	·92	— 1·11	·22	1	10	64·0	21*b*	29·0	4	4	...
IX.		Wetherby (Ribston Hall) ..	·91	— 1·60	·44	7	6	...	...	...	...	...	...
,,		Skipton (Arncliffe)	2·36	— ·70	·40	20	14	69·0	18	25·0	2	...	...
X.		North Shields	1·56	— ·44	·40	9	13	67·2	19	27·0	3	4	7
,,		Borrowdale (Seathwaite).....	9·45	+ 4·51	2·44	24	11	64·2	17	28·9	3	...	...
XI.	WALES.	Cardiff (Ely).....	2·60	+ ·26	·58	1	12	...	...	...	...	...	...
,,		Haverfordwest	3·32	+ ·50	1·19	25	9	63·0	9	25·0	2	11	20
,,		Plinlimmon (Cwmsymlog) ...	1·74	...	·41	25	10	...	...	...	...	..	...
,,		Llandudno.....	1·31	— ·57	·27	6	12	61·2	19	32·0	3	...	...
XII.	SCOTLAND.	Cargen [Dumfries]	3·57	+ 1·28	1·62	24	9	64·0	18	26·6	3	5	...
,,		Jedburgh (Sunnyside).....	2·13	+ ·43	·49	10	12	65·0	18*c*	25·0	4	8	...
XIV.		Douglas Castle (Newmains)	2·23	+ ·35	·69	21	8	...	...	...	..	...	...
XV.		Lochgilphead (Kilmory).....	2·51	— ·12	·80	24	12	...	...	...	...	...	...
,,		Oban (Craigvarren)	2·87	...	1·06	20	12	58·5	17*i*	33·0	16	0	...
,,		Mull (Quinish).....	2·28	...	·62	24	11	...	...	...	...	...	...
XVI.		Loch Leven Sluices	2·30	+ ·09	·70	11	8	...	...	...	...	...	...
,,		Arbroath	2·65	+ ·74	·83	24	11	62·0	19*d*	31·0	2*f*	6	...
XVII.		Braemar	3·80	+ 1·72	·90	25	14	57·8	18	23·2	14	14	22
,,		Aberdeen	1·82	...	·71	24	14	65·0	19	29·0	13*g*	4	...
XVIII		Skye (Sligachan)	...	...	...	...	...	...	...	...	...	...	...
,,		Culloden	...	...	...	...	...	...	...	...	...	...	...
XIX.		Dunrobin	1·25	...	·41	24	7	61·5	18	30·0	14	6	...
,,		Orkney (Sandwick)..... ..	1·43	— ·44	·35	1	16	57·1	30	28·8	3	4	13
XX.	IRELAND.	Cork (Blackrock)	4·93	+ 1·83	1·26	5	15	75·0	18*c*	28·0	2	5	...
,,		Dromore Castle	2·95	...	·45	20*a*	14	60·0	19	31·0	2	...	...
,,		Waterford (Brook Lodge) ...	4·23	...	1·53	21	12	64·0	18	28·0	3	5	18
,,		Killaloe	...	...	...	...	...	...	...	...	...	...	...
XXI.		Portarlington	2·82	+ ·79	·83	21	14	65·5	20	31·5	8	6	...
,,		Dublin (FitzWilliam Square)	2·91	+ ·80	·62	21	16	66·1	19	32·2	3	2	9
XXII.		Ballinasloe	2·35	+ ·09	·44	21	16	62·0	19	29·0	4, 9	11	...
XXIII		Waringstown	2·13	+ ·24	·60	21	14	68·0	19	28·0	7*h*	6	11
,,		Londonderry (Creggan Res.).	1·44	...	·19	20	18	...	...	...	...	...	..
,,		Omagh (Edenfel)	...	...	...	..	...	...	...	...	...	...	...

a And 21. *b* And 28. *c* And 19. *d* And 20. *e* And 3, 4. *f* And 17. *g* And 14, 16. *h* And 8, 14. *i* And 19.

+ Shows that the fall was above the average ; — that it was below it.

METEOROLOGICAL NOTES ON APRIL.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—A fine month with much cold wind, and low temp. at night, and all crops made great progress; profusion of blossom on all fruit trees. Peacock-butterfly flying on 14th; first swallow seen on 15th; cuckoo first heard on 16th, and nightingale and wryneck on the 20th. Blackthorn in flower on 5th.

HITCHEN.—The hottest April since 1870.

BANBURY.—Mean temp. 45°·4, about the average; H and R and S in very large flakes on 15th; dripping mist on 10th; H on 26th; high wind on 6 days; cuckoo heard on 26th, nightingale on 28th.

CULFORD.—The month commenced with cold and frosty nights, but the weather being dry no injury was done to fruit trees.

LANGTON HERRING.—On the whole a fine month; during the first half the temp. was much below the average, but a change took place on the 16th, and the temp. from that day was above the average; the mean for the whole month was about 1° below the average of 12 years. E. winds very prevalent; T and high wind on 25th; fog on two days.

BODMIN.—The largest rainfall recorded in April for many years, being 2·80 in. above the average of 36 years; mean temp. 47°·3.

STROUD.—Cold winds and a backward spring. S.W. gale on the 25th.

WOLSTASTON.—There were sharp frosts at night during the early part of the month, and S fell heavily on the 15 and 16th; severe gales occurred on 5th and 24th. Mean temp. 44°·6; cuckoo first heard on 22nd; swallows seen on 20th.

ORLETON.—The weather was uniformly cold with a prevalence of cloudy days and frosty nights till the 17th, when a great rise of temp. took place, and it continued warmer till the end of the month. The mean temp. was more than 2° below the average of 24 years, but the max. was above 70° on three days. The weather was favourable for all farming operations, and for vegetation which was kept back. Pressure was generally low and unsteady, but the fluctuations were not great. Very strong wind on 25th, and a few trees blown down; cuckoo heard on 19th; many swallows seen on 21st.

LEICESTER.—The early part of the month was dull and cold; N. and N.E. winds prevailed until the 19th, when a change to S.W. occurred, after which the air was more genial and warm. R needed at the close of the month.

MANCHESTER.—A dry month, although the rainfall was about one-third greater than in April last year, and one-fourth greater than in April, 1883. There were several frosty nights at the beginning of the month, which retarded vegetation, and did no damage; the min. temp. rose as the month advanced, and the weather became quite genial, and vegetation made great progress.

SEATHWAITE.—Dry at the beginning of the month, and cold during the first half; very wet from 20th to 25th, 7·87 in. falling in the six days.

WALES.

HAVERFORDWEST.—R fell in large quantity on the morning of the 1st, followed by sharp frost till the 5th, when it blew a fresh gale with heavy R; broken, cold weather followed till 8th, from which date to the 15th it was keenly cold; from 17th to 20th very fine, warm, summerlike days occurred, after which the temp. decreased again, and it was stormy and wet from 25th to 27th, it was then cold to the end. A severe month, all fodder used up and no grass. Blackthorn blossomed on the 15th; cuckoo heard on the 25th.

SCOTLAND.

CARGEN.—Mean. temp. 1°·4 below the average. The first half of the month was unusually cold, northerly and easterly winds prevailing. Vegetation was very backward, a few beech trees only breaking into leaf towards the end of the month. 3·25 in. of the total R fell between the 20th and 25th.

JEDBURGH.—Remarkably dry weather with cold N.E. and E. winds until about the 19th; vegetation up to that date was very backward, and grass fields very brown. 1½ in. of S on 2nd; much T on 25th.

BRAEMAR.—The month, although cold, was favourable for seed sowing, but growth was much retarded.

ABERDEEN.—The weather was very seasonable for the agriculturist. Rainfall about half an inch below the average.

SANDWICK.—On the 2nd very severe H showers occurred, several panes of glass being broken in windows. The showers were worst in the early morning, from 4 a.m. to about 7 a.m.; one H stone was found to weigh 26 grains, and when melted measured 20 minims. Hoy hill white on 1st.

IRELAND.

BLACKROCK.—The max. temp. of the 18th and 19th was the highest recorded in April during the last 10 years.

DROMORE.—The first part of the month was rather hard with E. wind, and very little vegetation. Towards the end of the month heavy falls of R occurred at night, but the days were fine with showers and sunshine, and vegetation made great progress.

WATERFORD.—All the early part of the month E. and N.E. winds prevailed. Rainfall about 1·50 in. above the average of 25 years. Swallows seen on 16th; cuckoo heard on 25th; H on the 1st; trees very late in coming into leaf.

DUBLIN.—Until the 17th the weather was cold and dry with searching "polar" winds, but on that date the long-delayed spring may be said to have arrived with the setting in of equatorial winds. A burst of summerlike warmth on the 18th and 19th was followed by copious rains, soft winds and occasional hot sunshine by day, and rather low temp. by night. The mean temp. (45°.6) was 1°·4 below the average. Sleet fell on the 1st and 5th; H on the 9th and 16th; fog on five days. Mean humidity, 80; mean amount of cloud, 5·6; prevailing winds E., S.S.E., and S.W.

BALLINASLOE.—The first part of the month was generally fine, but with strong harsh winds, principally from E. and N.E.; the latter portion was wet, the harsh winds continuing.

WARINGSTOWN.—A most favourable month for farming operations, but grass at least three weeks later than usual, and all spring growth unusually backward, foliage being often as forward in the first week of April, as it was this year at its close.

FROST OF 1739-40.

To the Editor of the Meteorological Magazine.

SIR,—The following extract from Harrod's "Antiquities of Stamford," may, perhaps, be of interest to the readers of your Magazine:—

"In the hard frost in 1740, at two different days, a sheep and a hog were roasted on the river Welland, where the ford is at the opening in Water-street. The printers also came and got much money by printing persons' names who assembled there. The hard frost began on Christmas eve in 1739, and lasted till Lady-Day, 1740; the greatest degree of cold was on January 5th in the morning; it frequently relented in the forenoon, but was sure to return at night; however, it was not so intense as the frost in 1709, when the Adriatic Sea was so frozen that it might be passed on foot, so that had the Venetians been at war with the Turks their city might have been taken by a land army. . . . . "—Yours truly,

FRED. COVENTRY.

Ketton Hall, Stamford, May 11th, 1885.